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Fermenting Process (2)

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Date of Application, 26th Apr., 1898

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PROVISIONAL SPECIFICATION.

Improved Process for Fermenting Worts.

I, Jean Effront, of 72, Rue du Marais, Brussels, in the Kingdom of Belgium, Professor of Chemistry, do hereby declare the nature of this invention to be as follows:—

This invention has for its object a process for the integral fermentation of dextrinated wort by the utilisation for this object of a yeast of a special culture, said process having the great advantage over the fermentation of ordinary wort of allowing the use of large proportions of malt to be suppressed together with the inconveniences arising therefrom, the most serious of which in addition to material losses, consists in the creation of one of the main sources of infection impeding the fermentation, acidifying the wort, spoiling the yeast, and destroying the diastase by reason of the deleterious action of the ferments and spores of the malt which it is impossible to destroy by the low temperature imposed on the saccharification, whilst on the contrary in the dextrination of worts the proportion of malts becomes a minimum, and the high temperature employed insures the destruction of all bad or deleterious kinds of ferments.

The improved process for the fermentation of dextrinated worts is based on the tendency evinced by certain kinds of beer yeast to ferment dextrine, the said property although very imperfect and only existing as a tendency being capable of being developed to a very high degree by a culture or nutrition of yeast in special media favourable to the physiological properties of the cells of all beer yeast without distinction of kind in order to act very vigorously on the dextrine.

In order to be able to cultivate beer yeast in dextrinated worts and to utilise it in the integral fermentation of same, it is first subjected to a preparatory culture repeated in a nutritive medium composed partly of glucose or cane sugar, and mineral substances such as nitrate of potash, and partly of aldehyde, the whole being absolutely free from organic azotic substances.

The yeasts subjected to this preparatory treatment evince a pronounced tendency to ferment dextrine, which property is then carried to a very high degree by their ultimate introduction into a medium containing larger and larger proportions of dextrine.

The two periods of acclimatization are effected under the following conditions: First period or preparatory culture.

Ten litres of a 15% solution of sugar containing 5 grammes of yeast dregs and 4 grammes of nitrate of potash are sterilised for an hour at 100° Centigrade and then cooled. 2 grammes of aldehyde and 150 grammes of pure yeast free from ferments are then added and the whole is fermented to 25° C. until about half the sugar in the solution has disappeared, it is then filtered and 150 grammes of yeast of this product is collected and introduced afresh into a saccharine solution of the composition hereinbefore described and is allowed to again ferment until about half the sugar of the solution has disappeared.

After numerous repetitions of this operation, for instance after 40 to 50 cul-

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tures, when the yeast commences to ferment very rapidly and shows itself very vigorous, the quantity of nitrate of potash and aldehyde is gradually increased, maintaining the proportions of sugar and yeast.

The quantity of nitrate is increased by 2 grammes and that of aldehyde by 1 gramme for each repetition, but it is only when the fermentation becomes regular, that it is advanced to 8 grammes of nitrate and 4 grammes of aldehyde. Then the increase is effected gradually in proportion as the yeast becomes acclimatised until for 10 litres of the saccharine solution there are employed 50 grammes of nitrate, and 40 grammes of aldehyde which proportions terminate the first period of acclimatization.

When this degree of acclimatization has been reached, the yeast may be cultivated in wort containing dextrine and it is its acclimatization to ever increasing proportions of dextrine up to pure dextrine that marks the second period which is commenced as follows:—

$1^1/_2$ kilogrammes of starch is dissolved in 6 litres of water at 70° C. and then an infusion of malt arising from 15 grammes of dry malt is added thereto. This mixture is maintained at 68° C. for an hour and the whole is again raised to 9 litres by adding 4 litres of a 15% sugar solution containing 5 grammes of yeast dregs and 50 grammes of nitrate of potash, it is then neutralised and 40 grammes of aldehyde and 150 grammes of acclimatised yeast of the first period is added and the whole is allowed to ferment for 24 hours.

Four litres of this wort are then drawn off and fermented afresh in 7 litres of a dextrinated wort prepared in the manner hereinbefore described.

After repeated passages into this dextrinated wort renewed every 24 hours, the proportion of cane sugar is reduced, and instead of 4 litres of saccharine solution only 3 litres, 2 litres, and finally 1 litre are employed and the diminution is gradually continued as the wort is more easily and completely attenuated until in 24 hours an attenuation of 4° to 5° Balling is reached. When this attenuation has been reached for a mixture of 1 litre of saccharine wort and 9 litres of dextrinated wort the sugar is entirely dispensed with and fermentation is continued in the wort containing the dextrine.

When this point of culture has been reached the wort may serve for cultivating industrial yeast. For this object 10 litres of wort fermented is caused to work in 40 litres of dextrinated wort, and with 40 litres thus obtained 160 litres of fresh wort may be made and so forth.

This yeast may be preserved by passing it through a filter press or better still by drying it *in vacuo* first at a temperature of 30° C. and finally of 40° C.

This yeast may serve also as mother yeast in distilling, and in order to make the barm the following process is employed.

Wort from potatoes or grain is boiled under pressure and then saccharified at a temperature of 65 to 70° C. with 1 to 2% of malt employing such conditions that a wort containing 17 to 19% of extract is obtained, and then the wort is cooled to 30° C.

$1^1/_2$ to 3 kilogrammes of yeast per hecto litre of this wort are then employed and after 24 hours fermentation 25 litres are withdrawn as mother yeast with which 100 litres of fresh yeast are made for the next day, whilst the 75 litres remaining serve for fermenting 2,500 litres of dextrinated wort.

The barm thus obtained may work for 30 to 40 days without losing appreciably its diastasic power. In any case it is advisable to change the mother yeast every 15 to 20 days. The alteration of the yeast may be provided against by adding every 3 or 4 days for instance, to the wort intended for the preparation of the yeast, quantities of 50 grammes of nitrate and 20 to 50 grammes of aldehyde per hectolitre of yeast wort.

These yeasts do not act so well on dextrine obtained by means of acid as on that obtained by means of malt, so that it is preferable to employ it in a small quantity in ordinary working in producing dextrine.

The wort to be fermented is prepared in the same way as wort serving for the preparation of the yeast that is to say that the substances first boiled are liquefied by 1 to 2% of malt at a temperature of 65° C. to 70° C.

Dated this 25th day of April 1898.

WM. P. THOMPSON & Co.,
Of 6, Lord Street, Liverpool, Agents for the Applicant.

COMPLETE SPECIFICATION.

Improved Process for Fermenting Worts.

I, JEAN EFFRONT, of 72, Rue du Marais, Brussels, in the Kingdom of Belgium, Professor of Chemistry, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has for its object a process for the complete & perfect fermentation of dextrinated wort by the utilisation for this object of a yeast of a special culture, said process having the great advantage over the fermentation of ordinary wort of allowing the use of large proportions of malt to be suppressed together with the inconveniences arising therefrom, the most serious of which in addition to material losses, consists in the creation of one of the main sources of infection impeding the fermentation, acidifying the wort, spoiling the yeast, and destroying the diastase by reason of the deleterious action of the ferments and spores of the malt which it is impossible to destroy by the low temperature imposed on the saccharification, whilst on the contrary in the dextrination of worts the proportion of malt becomes a minimum, and the high temperature employed insures the destruction of all bad or deleterious kinds of ferments.

The improved process for the fermentation of dextrinated worts is based on the tendency evinced by certain kinds of beer yeast to ferment dextrine, the said property although very imperfect and only existing as a tendency being capable of being developed to a very high degree by a culture or nutrition of yeast in special media favourable to the physiological properties of the cells of all beer yeast without distinction of kind in order to act very vigorously on the dextrine.

In order to be able to cultivate beer yeast in dextrinated worts and to utilize it in the complete & perfect fermentation of same, it is first subjected to a preparatory culture repeated in a nutritive medium composed partly of glucose or cane sugar, and mineral substances such as nitrate of potash, and partly of formic aldehyde, the whole being absolutely free from organic nitrogenous substances.

The yeasts subjected to this preparatory treatment evince a pronounced tendency to ferment dextrine, which property is then carried to a very high degree by their ultimate introduction into a medium containing larger and larger proportions of dextrine.

The two periods of acclimatization are effected under the following conditions:

First period or preparatory culture:—

Ten litres of a 15% solution of sugar containing 5 grammes of dried & powdered yeast and 4 grammes of nitrate of potash are boiled for an hour at 100° Celsius and then cooled, 2 grammes of formic aldehyde and 150 grammes of pure yeast are then added and the whole is fermented at 25° C. until about half the sugar in the solution has disappeared, it is then filtered and 150 grammes of yeast of this product is collected and introduced afresh into a saccharine solution of the composition hereinbefore described and is allowed to again ferment until about half the sugar of the solution has disappeared.

After numerous repetitions of this operation, for instance after 40 to 50 cultures, when the yeast commences to ferment very rapidly and shows itself very vigorous, the quantity of nitrate of potash and formic aldehyde is gradually increased, maintaining the proportions of sugar and yeast.

The quantity of nitrate is increased by 2 grammes and that of formic aldehyde by 1 gramme for each repetition, but it is only when the fermentation becomes very active, that it is advanced to 8 grammes of nitrate and 4 grammes of formic aldehyde. Then the increase is effected gradually in proportion as the yeast becomes acclimatised until for 10 litres of the saccharine solution there are employed 50 grammes of nitrate, and 40 grammes of formic aldehyde which proportions terminate the first period of acclimatization.

When this degree of acclimatization has been reached, the yeast may be cultivated in wort containing dextrine and it is its acclimatization to ever increasing proportions of dextrine up to pure dextrine that marks the second period which is commenced as follows:—

1½ kilogrammes of starch is dissolved in 6 litres of water at 70° C. and then an infusion of malt arising from 15 grammes of dry malt is added thereto. This mixture is maintained at 68° C. for an hour and the whole is again raised to 9 litres by adding 4 litres to make up for the loss by evaporation of a 15% sugar solution containing 5 grammes of dried and powdered yeast and 50 grammes of nitrate of potash, it is then neutralised and 40 grammes of formic aldehyde and 150 grammes of acclimatised yeast of the first period is added and the whole is allowed to ferment for 24 hours.

Four litres of this wort are then drawn off and fermented afresh in 7 litres of a dextrinated wort prepared in the manner hereinbefore described.

After repeated passages into this dextrinated wort renewed every 24 hours, the proportion of cane sugar is reduced, and instead of 4 litres of saccharine solution only 3 litres, 2 litres, and finally 1 litre are employed and the diminution is gradually continued as the wort is more easily and completely attenuated until in 24 hours an attenuation of 4° to 5° Balling is reached. When this attenuation has been reached for a mixture of 1 litre of saccharine wort and 9 litres of dextrinated wort the sugar is entirely dispensed with and fermentation is continued in the wort containing the dextrine.

When this point of culture has been reached the wort may be employed for cultivating industrial yeast. For this object 10 litres of saccharine wort is caused to work in 40 litres of dextrinated wort, and with 40 litres thus obtained 160 litres of fresh wort may be made and so forth.

This yeast may be preserved by passing it through a filter press or better still by drying it *in vacuo* first at a temperature of 30° C. and finally of 40° C.

This yeast obtained in this way may serve as mother yeast in distilling, and in order to make the barm the following process is employed,—

Wort from potatoes or grain is boiled under pressure and then saccharified at a temperature of 65 to 70° C. with 1 to 2% of malt employing such conditions that a wort containing 17 to 19% of extract is obtained, and then the wort is cooled to 30° C.

1½ to 3 kilogrammes of yeast per hectolitre of this wort are then employed and after 24 hours fermentation 25 litres are withdrawn as mother yeast with which 100 litres of fresh yeast are made for the next day, whilst the 75 litres remaining serve for fermenting 2,500 litres of dextrinated wort.

The barm thus obtained may work for 30 to 40 days without losing appreciably its diastasic power. In any case it is advisable to change the mother yeast every 15 to 20 days. The alteration of the yeast may be provided against by adding every 3 or 4 days for instance, to the wort intended for the preparation of the yeast, quantities of 50 grammes of nitrate and 20 to 50 grammes of formic aldehyde per hectolitre of yeast wort.

These yeasts do not act so well on dextrine obtained by means of acid as on that obtained by means of malt, so that is is preferable to employ it in a small quantity in ordinary working in producing dextrine.

The wort to be fermented is prepared in the same way as wort serving for the preparation of the yeast, that is to say that the substances first boiled are rendered more fluid by the addition of from 1 to 2% of malt at a temperature of 65° C. to 70° C.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An improved process for fermenting dextrinated wort by means of a yeast acclimatized to the dextrine, consisting in fermenting the yeast in a wort prepared from a sugar solution containing dried and powdered yeast and mineral salts such as nitrate of potash with the addition of formic aldehyde after sterilization; in then fermenting the collected yeast in a wort of the same composition and in repeating frequently this operation but with increasing proportions of nitrate and aldehyde for each cultivation; in then fermenting the yeast of the last culture in a wort of dextrine mixed with a solution of sugar, dried and powered yeast and nitrate of potash with the addition of aldehyde after neutralisation and in fermenting the results of this culture in wort of the same composition but having a proportion of sugar decreasing up to entire suppression, in order to afterwards ferment, by means of the wort obtained, dextrinated worts in large quantities, substantially as hereinbefore described.

2. In the process for the fermentation of dextrinated worts hereinbefore described, the use of nitrate of potash and formic aldehyde in a suitable stage of the manufacture or in its preparatory operations, substantially as described.

Dated this 22nd day of December 1898.

WM. P. THOMPSON & Co.,
Of 6, Lord Street, Liverpool, Agents for the Applicant.

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